

## Research Translation Core Project Descriptions

### Boston University

The intent of the Research Translation Core is to make BU SBRP goals and objectives consistent with and accountable to NIEHS SBRP mandates under SARA. The Core is designed to communicate the program's findings in a way appropriate to local, state and federal agencies concerned with Superfund pertinent problems, to local community, regional or national environmental groups and to affected industry or scientific/professional communities. It establishes partnerships with local (water districts), state (Toxic Use Reduction Institute) and federal (EPA Region I) agencies and has mechanisms to make completely commented computer code, user manuals and the software itself freely available under a public license; and reagents and animal models, with appropriate documentation similarly accessible. An inventory of available materials is kept on a public website for convenient access. A broad range of technical and educational materials, including workbooks for use by community groups, is also available on the website and distributed in hardcopy form through the Community Outreach Core and its partners in the community. The contents of the website are published to the internet through syndication (RSS feed).

### Brown University

The Research Translation Core aims to develop and provide efficient mechanisms by which the results of the program research, and relevant research outside of the program, become available to the program's stakeholders. The stakeholders are defined by the choice of a state-based approach centering on Rhode Island. The mechanisms for conveying results out from the program include both technical information communication as well as technology transfer. There is coordination with key state agencies- the RI Dept. of Environmental Management (Environmental Protection Bureau) and RI Dept. of Health Office of Environmental Risk Assessment, fostered by a project-funded, Brown-based state agencies liaison (SAL). The SAL coordinates communications on current issues between Brown and the state agencies, and between the state agencies themselves. The core Leader, Co-Leaders and SAL use advanced social science tools to define effective communications concerning the health implications and management options for complexly contaminated sites in RI. Stakeholders include health professionals (to be reached by targeted continuing medical education courses and grand rounds), as well as developers, legal professionals and environmental professionals. The Outreach Core separately describes efforts aimed at the general public. The project's researchers serve as principal experts for some communications, but also serve as information gatekeepers for their areas- identifying as needed experts and sources of information external to the project. The SAL identifies where the stakeholders have immediate information needs and the project leaders help formulate a response. Meanwhile, in addition to traditional publication and seminar routes for dissemination of their research results, the project leaders are assisted by the SAL in organizing targeted

scientific conferences allowing interchange of advanced research. There will also be a funded technology transfer mechanism, set up in conjunction with Brown's technology partnership program.

### Columbia University

The Research Translation Core provides the framework for sustained communication among research projects, cores, governmental agencies, and interested parties through monthly seminars, its website, and meetings. A central theme of the RTC activities is more direct involvement with ongoing priorities of selected governmental agencies responsible for minimizing human exposure to arsenic (As) and manganese (Mn) through domestic water supplies derived primarily from groundwater. Each public agency is encouraged to identify and share relevant data holdings. Project investigators integrate these multi-source data into an accessible Geographic Information System (GIS) and produce maps to enhance monitoring and regulatory decision making. The data integration assists agencies and other stakeholders lacking GIS capacity and permits others to expand their capabilities. The public agencies involved are located in four states (NJ, NY, NH, ME) and include county as well as federal and state personnel. Their approach is to integrate existing geophysical, geochemical, hydrological, and socio-demographic data for the Newark basin and adjacent areas of northern NJ and southern NY to assess sources (natural and anthropogenic) and human exposure to elevated groundwater As and Mn. These efforts include field collaboration with government programs in Rockland County and six other counties in the Hudson valley. Environmental isotopes (tritium- $^3\text{He}$ ) are being measured to derive groundwater recharge histories relevant to As and Mn concentrations. Landfills as a potential source for elevated groundwater As and Mn are being evaluated through joint field and laboratory measurements of iron (Fe) floc deposits, indicative of their mobilization in suboxic to anoxic groundwaters. Preliminary measurements of Fe floc chemistry adjacent to landfills indicate frequent high levels of As in areas that include large numbers of new homes using private wells. As part of an investigation of potential impacts of elevated drinking water As on cognitive function in children, two of the research projects involve numerous measurements of groundwater chemistry in two New England states. The researchers are integrating the new data into GIS formats compatible with those employed by public agencies in NH and ME to help evaluate patterns of exposure to As and Mn in groundwater. Information on exposure potential and treatment options are being shared with the public primarily through governmental agency communication channels.

### Dartmouth College

The mission of the Superfund Basic Research Program is to produce scientific knowledge that has relevance for protecting the environment and public health. But for research outcomes to be applied in these settings, the findings and expertise of program scientists must be communicated to the right audiences at the right time: this is the role of the

Translation Core. The scientific goal of this research program is to understand how toxic metals contribute to adverse effects on human health and the environment. The outcomes of the research have direct relevance to the environmental and public health issues of the region and the nation. Arsenic-contaminated drinking water is a global health issue, and exposure to arsenic through drinking water is a priority public health issue in New Hampshire, where naturally occurring arsenic can leach from bedrock into drinking water. Mercury contamination in fish is a national concern with particular relevance in New England, where fish with high mercury concentrations can be found even in the most pristine lakes. As the proactive communication arm of this program, the role of the Translation Core is to plan and implement strategies for communicating the relevance and significance of its research to regional and national stakeholders in the times and places best suited to these audiences. To this end, the goals of the Translation Core are to:

1. Collaborate with investigators to identify findings with scientific significance and/or relevance for public policy, public health, remediation, or environmental risk management;
2. Identify specific end users for the knowledge produced by program scientists and to develop tools to share and interpret scientific data with those users in a timely manner;
3. Extend the reach of the SBRP program by serving as a credible, reliable liaison to scientific expertise throughout the SBRP national network;
4. Provide expertise in science and risk communication, community involvement and media relations;
5. Develop and maintain resources that support effective translation (science writing, graphic illustration, web development)
6. Educate the program's trainees to communicate effectively with other scientists and with the public.

### Duke University

The Duke University Superfund Basic Research Program Research Translation Core seeks to deliver the Center's research results to critical members of the scientific, governmental, and lay community. Objectives for the Research Translation Core include:

1. To serve as a bridge between center investigators and national, state, and local environmental health officials regarding the research interests and results of the former and the research needs of the latter.
2. To target joint academic/practicing professional audiences for research translation on scientific questions related to developmental toxicity.
3. To maintain timely, informative, and user-friendly mechanisms for disseminating information on the research activities of center investigators, including a website and an electronic newsletter.

The Research Translation Core is co-directed by Marie Lynn Miranda (Outreach Core PI) and Richard Di Giulio (Center PI). This combination ensures that the full suite of research results emanating from the Duke Superfund Center are communicated to multiple audiences using appropriate and tailored formats.

#### Michigan State University

The Research Translation Core has planned a series of activities that include collaborations with government agencies, meetings and new websites providing technology transfer and communication to a broad audience as suggested by the SBRP RFA. They have initiated the recruitment of a group of cooperators that include federal and state agencies in Michigan and New Jersey and industrial consortiums in the same states. These documented cooperating units have indicated their interest in participating in technology transfer and core staff continue to recruit new cooperators using the same methods the core have employed to date. An annual one-day meeting with representatives of the cooperating institutions is held in which selected projects present highlights of their research progress. Cooperators are asked to present their views of research needs in the areas of site remediation and health risk analysis. A generous amount of time is set aside for individual and group discussions in an attempt to foster agreements and resolve differences. In addition, an international symposium on computational and modeling approaches is held to enhance the understanding and extent of the health threat from environmental contamination. This activity is supported using funds from a variety of sources. The meeting enriches this research program which emphasizes the computational system biology approach spanning from molecule to intact organisms. This approach promises more accurate predictability of impacts on human health resulting from exposure to TCDD-like environmental contaminants. In a different and innovative approach to research translation, a set of molecular tools for use in identifying the capacity of microbial consortia to degrade hazardous chemicals in the environment is being developed in specific projects and cores of the research program. These molecular tools are being placed in a data repository including a website open for public use. The website contains a variety of tools developed by investigators in this and other programs. These tools are maintained and kept up to date by incorporating new information as it emerges from this effort as well as that of others. A tutorial is being produced to inform users and instruct them on the use of the tools and information in the repository. This activity serves research scientists, biodegradation engineers and administrators to make more rapid progress in developing strategies to decontaminate and detoxify sites containing hazardous chemicals.

#### Texas A & M University

The Research Translation Core of the Texas A&M Superfund Basic Research Program (SBRP) performs activities conducted in previous years by either the Outreach or Field Studies Core. The major focus of this core is to integrate SBRP test protocols into risk characterization, and to collaborate with the USEPA and the Texas Commission on

Environmental Quality (TCEQ) staff to provide training and rapid communication of research results. In addition, the Core maintains lines of communication with State and Federal regulators to identify information needs. The objectives of this core include:

1. Collaborate with site managers in USEPA Regions 6 (Dallas) and 10 (Seattle) in support of risk characterization activities at Superfund sites;
2. Conduct periodic meetings with USEPA and TCEQ personnel to identify information needs and communicate research results;
3. Develop web-based and distance learning programs for training of regulatory personnel; and,
4. Organize a biennial conference on Central and Eastern European Environmental Health.

Activities of the Research Translation Core focus on direct application of results to exposure or risk characterization at Superfund sites and support the transfer of bioassay protocols into risk characterization of complex mixtures.

#### University of Arizona

The overall goal of the Research Translation Core is to actively communicate the research products generated by its SBRP to pertinent audiences and stakeholders in the most appropriate and effective manner. An important part of the research process is making sure that stakeholders are aware of innovative research products. Unfortunately, it is all too common that a major divide exists between generation of cutting-edge research products and the transfer of those products to stakeholders for application of technology in the field or for use of information in decision-making. To bridge this division and to ensure that stakeholders have effective and timely use of generated research products, research programs must conduct research translation activities. Research translation consists of two main activities: information transfer and technology transfer. Thus the core's goals toward the following specific objectives were developed:

1. Develop methods to promote and enhance research translation, include both technology transfer (e.g. product commercialization) and information transfer to appropriate audiences.
2. Develop linkages and partnerships with government agencies and other stakeholder encourage collaboration.
3. Establish effective communication with stakeholders through traditional, innovative communication tools.

#### University of California-Berkeley

The overall goal of the Research Translation Core is to translate research findings and scientific knowledge for government agencies, relevant business interests, and general

audiences involved in the remediation of Superfund sites and efforts to protect public health. Specifically the objectives of the core are to:

1. Involve stakeholders and project investigators in the development of case studies to demonstrate how measurements from the lab on remediation technologies are scaled to larger, more complex conditions encountered at Superfund sites and how field results can be applied (scaled) to other sites;
2. Identify areas of emerging research significant to environmental health practice. The Core reviews key research findings, assesses their implications for policy and practice contexts, and develops a synthesis assessing how emerging research can be applied to identify and support actions to protect public health or improve environmental quality;
3. In partnership with government agencies, plan and conduct workshops that examine critical issues in application of environmental health sciences research results in policy contexts relevant to achieving the goals of the Superfund program, involving investigators in disciplines relevant to science and policy as well as government agencies working in areas such as risk assessment and benefits assessment;
4. Develop and evaluate communication methods to translate analyses developed through Aims 1 through 3, as well as the most recent research findings, into forms useful for technical audiences and government agencies, including federal and state health and environmental agencies, and the engineering profession, using products including research briefs that describe the context for the research, the questions investigated, the major findings, and the significance of findings from a practice perspective; and,
5. Develop and evaluate communication tools to translate analyses developed through Aims 1 through 3, as well as the most recent research findings, into forms useful and understandable for general audiences. These methods may include use of streamed video "short talks" by investigators presenting results in a conversational tone and communications tools such as research and policy briefs and web-based content.

This work better equips government agencies to use the most current knowledge in promoting public health practices. Further, it helps general audiences to better understand the significance of SBRP research and to participate in public policy discussions and it provides specifics on how to use the most current research in practical remediation projects.

#### University of California-Davis

The Research Translation Core (RTC) formalizes functions that have been on-going in the UC Davis Superfund Basic Research and Training throughout its history. Partnering with governmental agencies, technology transfer, and communicating research information to broader audiences has been carried out on many fronts throughout the program. This core proposal seeks to capitalize on the strengths of the existing program

in these areas, adds professional implementation and accountability, and proposes an innovative new cross-disciplinary model for the technology transfer. Core personnel work on several fronts, with program personnel including investigators and students, campus administrators and staff responsible for research development, public relations and technology transfer, to develop coherent and practical plans to take research information and products to targeted constituencies and consumers.

### University of California-San Diego

The Research Translation Core (RTC) of UC San Diego's Superfund Basic Research Program (SBRP) has four objectives:

1. Build partnerships with government agencies and Tribal science labs to advance the practical contributions of toxicogenomics in environmental policy and planning;
2. Evaluate the utility of molecular biomarkers/biosensors, microtechnologies and bioremediation as new biological models/methods for improving environmental monitoring, risk assessment and remediation;
3. Organize technology showcases, entrepreneurs/innovators forums and educational workshops to foster the commercial development and utilization of innovative SBRP technologies; and
4. Communicate complex research findings to broad audiences through periodic workshops; symposia; participation in regional, national and international conferences; publications, and Web-based systems.

The broad long-term objective is to apply toxicogenomic knowledge and biomolecular technologies to real-life problems concerning hazardous substances and environmental health. Along these lines, biomarkers developed by SBRP scientists are being evaluated, in partnership with the San Diego Baykeeper, Tribal labs and government agencies responsible for water quality monitoring, as potentially effective new cellular and analytic tools for detecting Superfund toxicants in contaminated watersheds. At the same time, SBRP-industry partnerships are promoting the experimental development and commercialization of novel bioremediation technologies (e.g., transgenic plants that can hyper-accumulate heavy metals out of contaminated soil), and microtechnologies (e.g., lab-on-a-chip that can be used as biosensors for detecting exposure to pesticides). The RTC's approach leverages strong working partnerships and information/visualization technologies already developed by the Regional Workbench Consortium (RWBC) in partnership with the San Diego Supercomputer Center. The RWBC was established as part of UCSD's SRRP Outreach Core (2000-2005); it is a Web-based research and learning network for sustainable development. The RTC's toolkit includes on-line geographic information systems (GIS), decision support systems (DSS), multimedia interactive stories, and 3D visualization.

## University of Iowa

The plans and activities of the Research Translation Core (RTC) of the Iowa Superfund Basic Research Program (ISBRP) are designed with four primary goals in mind: 1) to formally transfer technology to commercial entities able to develop and deliver products or services to the public; 2) to contribute to the development of sound public policies and practices; 3) to contribute to the research base in ISBRP investigator disciplines; and 4) to contribute to a broader public understanding of problems and solutions regarding environmental hazards and their remediation. Significant preliminary contacts and meetings have laid the groundwork for these plans, and designated liaisons (ISBRP faculty, staff) are responsible for sustaining or developing further relationships with identified partners. Technology transfer activities of the Synthesis Core, the Analytical Core, and several projects are supported by RTC staff and assisted by the University of Iowa Research Foundation (UIRF). Technology transfer activities involve the academic research community and industry, and receive guidance from the RTC External Advisory Committee. A comprehensive communications plan reflects and guides overall decision-making on how, when and to whom research findings are disseminated and information distributed. This core works in close coordination with the Community Outreach Core (COC). RTC personnel have exceptionally broad experience in research translation and community organization; their many years of combined experience provide the knowledge, skills, and contacts to achieve core aims.

## University of Kentucky

The University of Kentucky Basic Superfund Research Program is focused on the environmental health impacts of chlorinated organics—with a more specific focus on PCBs and TCE. The Program includes five separate biomedical research projects investigating the biochemical and cellular mechanisms associated with exposure to such chemicals as well as the associated impacts on such diseases as cancer, diabetes, hypertension, and cardiovascular disease. One of the unique aspects of this research program is investigation of the role of nutrition in mitigating the impacts associated with such exposures. In addition, separate projects are examining the use of nanotechnologies and biosensors in detecting such chemicals in the environment and exploring novel techniques for remediation, with a particular focus on groundwater contaminated by TCE. The latter project has a specific potential for application as a result of ongoing remediation studies associated with the Gaseous Diffusion Plant in Paducah, Kentucky. The Research Translation translates the Program research to five targeted audiences: Government, Industry, Broad Audiences, Health Professionals, and Academia. Specific goals are summarized as follows:

1. Communicate important research outcomes to appropriate audiences to ensure the accurate and timely use of the data generated by individual research projects.
2. Develop and implement a mechanism for receiving feedback from the designated target audiences so as to confirm the utility and appropriateness of the communication tools selected.



3. Ensure that research results are being appropriately applied to immediate environmental and health issues through the use of partnerships and other communication tools.

#### University of North Carolina-Chapel Hill

During the last project period the UNC Superfund Basic Research Program generated over 200 publications in the peer reviewed literature, presented seminars describing the UNC SBRP research to diverse audiences all over the world, collaborated with other researchers and governmental agencies, and generated intellectual property resulting in several issued and pending patents. An important aspect of this program is translating research findings for use by many different groups. Program investigators have specifically targeted researchers and governmental agencies, local government and communities, and technology developers. Different mechanisms are used to translate research for each of these audiences. Major upgrades continue to the UNC SBRP website as a way to make information for a variety of groups readily available. Research publications are posted to the web, as are summaries suitable for the general public. The former Outreach Core has been subsumed under the Research Translation Core. RTC personnel continue the very successful communication with North Carolina State government, local government and community groups, as well as teachers. The goal for the project is to find ways to communicate research findings in a way useful to these audiences. The UNC SBRP has a long history of generating intellectual property. Core staff undertakes several efforts to enhance the translation of research findings to the technology developer community, including interaction with local venture capital groups, providing training for UNC investigators and students, and working with the UNC Office of Technology Development.

#### University of Washington

While the Research Translation Core is new, the activities related to the core have been important aspects of the UW SBRP for many years. The goals of the Research Translation core address the three required components: Technology Transfer, Government Agency Partnerships, and Communicating to Broad Audiences. Specifically, the Research Translation Core is: 1) Assisting investigators in moving UW SBRP research findings into application by continuing partnerships with the UW TechTransfer office. Dr. Clem Furlong, who has a long history of activity in the area of technology transfer, serves as the Director of the core. He has met with investigators to identify potential applications for the research proposed. 2) Continuing to develop communication strategies for SBRP investigators and agencies in order to exchange information regarding government agency priorities and SBRP research findings. Drs Furlong, Burbacher (Co-Director) and Ms. Acharya (Core Manager) have established relationships with local, state and federal government agencies. Individual meetings with agency representatives continue in order to develop strategies to address community concerns. A new Speakers Series is being developed in conjunction with agency partners aimed at

supporting speakers that can help address local issues important to their programs. Annual workshops, quarterly e-newsletters and print and web materials are also being developed to increase communications between SBRP investigators and agency staff. 3) Providing critical information to individual stakeholders by continuing to identify key communication venues and materials with government agencies and community groups. Procedures and materials are being developed for communities concerned about impacts from environmental contaminants, local and state agencies concerned about their community outreach, and for health professionals interested in environmental health education. The Research Translation Core provides the expertise needed to ensure that the scientific accomplishments of the UW SBRP are disseminated broadly and applied appropriately to immediate environmental health issues.